

BRIEF COMMUNICATION

THE TADPOLE OF THE AUSTRALOPAPUAN FROG *LITORIA NIGROFRENATA* (GÜNTHER, 1867) (ANURA: HYLIDAE)

The terrestrial hylid frog *Litoria nigrofrenata* occurs in seasonally dry forest and woodland habitats on Cape York Peninsula, the Torres Strait Islands, and in southern New Guinea¹. Little is known about its biology, and the tadpole is hitherto undescribed. We present observations on breeding activity of adult frogs and describe the tadpole, from Heathlands Reserve between Weipa and Bamaga on Cape York Peninsula (11°45'S, 142°35'E).

Reproductive activity was observed during February and April 1992, when males called from the banks of temporary rain-filled water bodies. None were observed to use elevated calling sites, and all called within 5 m of the water's edge. Oviposition occurred in five cattle watering tanks between December 1991 and February 1992, and tadpoles were also observed in a large (14.4 × 9.6 × 0.5 m) but temporary dam in April 1992. An amplexant pair (male = 38.0 mm SV, female = 46.0 mm SV) collected at the dam on 14.ii.1993 laid 445 eggs in a single clump 2-5 eggs deep. Reproductive activity was not observed during September and November/December 1991 when temporary water bodies were dry. Despite intensive searches, no *L. nigrofrenata* tadpoles were collected from permanent creeks (Cockatoo, Gunshot, Cholmondeley, and Bertie Creeks) or from two permanent swamps during the study, suggesting that this species breeds predominantly in temporary water bodies.

Tadpoles were collected from the dam and watering tanks in April 1992. Tadpoles (n = 288) were collected with a dip net, measured (body length) with vernier calipers, and staged². Some individuals were immediately preserved in 10% formalin. Others were reared to metamorphosis for identification. Preserved specimens were returned to the laboratory and standard measurements³ were made using vernier calipers (total length and body length) and a dissecting microscope with an optical micrometer (all other measurements). Measurements involving apertures were taken from the centre of the aperture.

Table 1 shows the size distribution of *L. nigrofrenata* at stages 25-39. A tadpole at stage 39 is illustrated in Fig. 1 and has the following dimensions (mm): 43.0 total length, 19.80 body length, 11.72 maximum body width, 11.34 maximum body depth, 4.41 basal tail muscle height, 3.53 basal tail muscle width, 4.54 maximum dorsal fin height located 8.57 from body terminus, 3.91 maximum ventral fin height located 6.30 from body terminus, 3.53 tail muscle height at maximum dorsal fin height, 4.03 tail muscle height at maximum ventral fin height, 4.91 distance between joining of ventral and dorsal fin aspects to body, 10.46 body width at eyes, 10.08 width of outer eye surfaces, 8.19 interorbital distance, 2.90 eye diameter, 1.01 pupil diameter, 0.38 narial diameter, 3.15 internarial distance, 2.39 snout-naris, 5.80 snout-eye, 11.09 snout-spiracle, 5.17 transverse oral disc diameter.

The oral disc of a tadpole at stage 39 is illustrated in Fig. 2. The mouth is anteroventral (almost ventral), and the posterior rim of the labium is strongly folded. The marginal papillae are in two rows anterolaterally and 2-3 rows posteriorly with a narrow gap anteriorly. Submarginal papillae occur in a large patch laterally on the posterior half of the

TABLE 1. Body length (mm) and Gosner (1960) stage of *Litoria nigrofrenata* tadpoles.

Stage	N	Mean body length ± SD
25	253	9.80 ± 2.94
26	8	16.74 ± 1.59
27	3	18.97 ± 0.97
28	1	19.00
29	2	17.60 ± 2.12
30	4	19.01 ± 1.17
31	8	19.62 ± 1.36
32	2	19.15 ± 0.64
35	1	20.40
37	1	20.90
38	5	20.86 ± 0.98
39	1	19.80

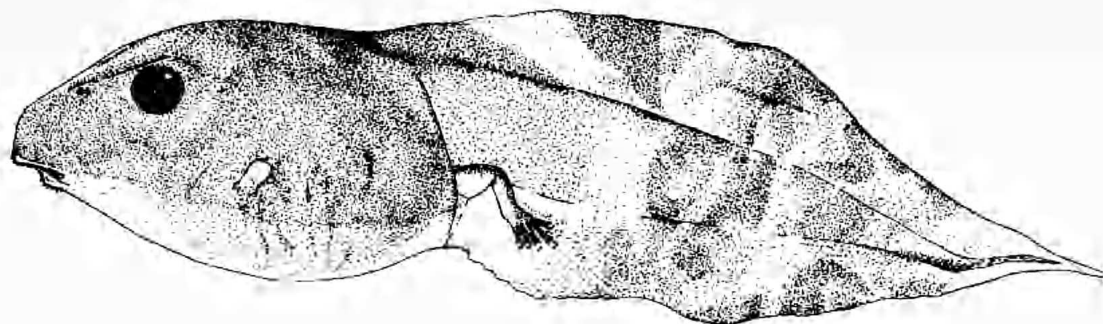


Fig. 1. Lateral view of a *Litoria nigrofrenata* tadpole at stage 39. Scale bar = 5 mm.

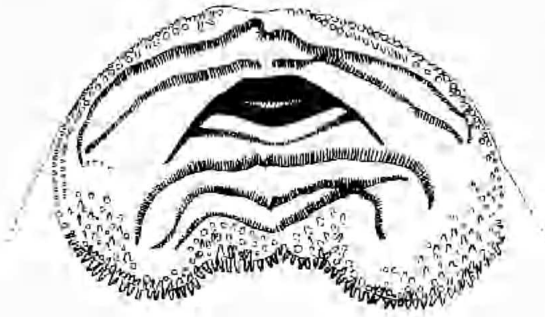


Fig. 2. Oral disc of a *Litoria nigrofrenata* tadpole at stage 39. Scale bar = 1 mm.

labium. The papillae on the anterolateral margins are smaller than those on the posterior margin, and the papillae in the outer row are smaller than those in the inner row. The tooth row formula is 2(2)/3 and the A2 gap is very narrow. One specimen has an additional, poorly developed tooth row located in the anterior gap in the marginal papillae. The keratinised jaw sheaths are narrow and serrated. The upper sheath is broadly curved (medial section almost straight), and the lower sheath is broadly V-shaped. The eyes are large and located dorsolaterally. The nares are dorsal, oriented slightly anterolaterally, and open almost vertically.

The body is oval and rather slender. The fins are high, arched, and terminate in a narrow tip or flagellum. The sinistral spiracle is located ventrolaterally and oriented posterodorsally. The lateral wall is longer than the medial wall and is unpigmented on the posterior two-thirds. The orifice is large, and is clearly visible in dorsal view. The vent tube is short, dextral, attached to the ventral tail fin, and opens 1.3 mm from the tail-body junction.

In life the dorsum is dark brown. A cream stripe runs from the tip of the snout through the top one third of the eye and terminates just posterior to the eye. The ventral surface has a copper pigmentation which extends one-third of the way up the lateral aspect of the body. Posteriorly, three pale stripes extend transversely from the lateral surfaces onto the dorsum, but do not connect dorsally. The pale stripes on the snout

and body are most conspicuous in small (stage 25) tadpoles, becoming indistinct in larger animals. The tail fins have a reddish coloration mottled with patches of dark pigment. The copper coloration of the ventral surface, the pale stripes and the reddish tinge of the tail fins disappear in preservative, but the patches of irregular, dark pigment on the tail fins are retained.

The maximum body length attained is 21.15 mm (Stage 38). The SV length of a recently metamorphosed individual (stage 46) was 16.85 mm, and the postocular stripe characteristic of this species was clearly visible.

It has been suggested^{4,5} that *Litoria nigrofrenata*, *L. personata* and *L. wotjulumensis* are more closely related to each other than to other Australian frogs. Similarities between the tadpoles of *Litoria wotjulumensis*⁶, and *L. nigrofrenata* support that proposed close relationship. *Litoria nigrofrenata* tadpoles share with *L. wotjulumensis* a tooth row formula of 2(2)/3, and arched, heavily mottled tail fins. *L. wotjulumensis* tadpoles apparently lack the patches of submarginal papillae on the lower labium and have a white venter⁶ (copper in *nigrofrenata*). The tadpole of *L. personata*⁵ differs from *L. nigrofrenata* and *L. wotjulumensis* in having a complete border of marginal papillae, gaps in the P1 and P2 tooth rows, low fins, and distinct gold stripes. The larval morphology of this species does not support a close relationship with the *L. nigrofrenata* species group.

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